

What is claimed is:

1 1. A data conversion apparatus which is used as a data
2 transmitting apparatus in a data communication system,
3 wherein the data communication system achieves pseudo
4 interactive communications by using one-way communications
5 between the data transmitting apparatus and a plurality of
6 data receiving apparatuses, the data conversion apparatus
7 comprising:

8 document storing means for storing a plurality of
9 documents each of which includes at least a character
10 string and at least a piece of image information, wherein
11 at least one of the character string and the piece of
12 image information includes a piece of link destination
13 information which specifies another document as a link
14 destination;

15 supplementary design storing means for storing a
16 list of supplementary designs with serial numbers
17 respectively related to the supplementary designs;

18 display image element generating means for reading
19 the character string and the piece of image information
20 one at a time from the document storing means and
21 converting the character string and the piece of image
22 information into respective display image elements,

23 wherein the display image elements are bit-mapped
24 graphics;

25 display image generating means for generating a
26 display image which is composed of the display image
27 elements, wherein the display image has a size which is
28 equivalent to a size of display screens of the plurality
29 of data receiving apparatuses;

30 supplementary design adding means for reading a
31 supplementary design corresponding to the piece of link
32 destination information specifying the other document as
33 the link destination from the supplementary design storing
34 means and adding the supplementary design to a
35 corresponding display image element in the display image;
36 and

37 display link destination information converting
38 means for converting the piece of link destination
39 information specifying the other document as the link
40 destination into a piece of display link destination
41 information, the piece of display link destination
42 information being related to a serial number corresponding
43 to the supplementary design added by the supplementary
44 design adding means, wherein the piece of display link
45 destination information specifies, as a link destination,

46 another display image which is a display image of the
47 other document generated by the display image generating
48 means.

1 2. The data conversion apparatus of Claim 1, wherein
2 the display image element generating means
3 includes:

4 a conversion table storing unit for storing a
5 character size of the character string; and

6 a display image element generating unit for
7 converting the character string into a display image
8 element according to the character size and converting the
9 piece of image information into a display image element.

1 3. The data conversion apparatus of Claim 2, wherein
2 the conversion table storing unit further stores
3 respective starting positions in a horizontal direction of
4 the display image elements, wherein

5 the display image generating means includes:

6 a display position calculating unit for reading the
7 starting positions of the display image elements and
8 calculating respective display positions of the display
9 image elements in the display image; and

10 a display image generating unit for generating the
11 display image by arranging the display image elements in
12 the display image according to the display positions.

1 4. The data conversion apparatus of Claim 3, wherein

2 the display image generating unit generates a
3 plurality of display sub-images from the document,
4 wherein

5 the display link destination information converting
6 means includes:

7 a display link destination information generating
8 unit for generating a plurality sets of pieces of display
9 link destination information which respectively correspond
10 to the plurality of display sub-images generated from the
11 document.

1 5. The data conversion apparatus of Claim 4, wherein the
2 supplementary design storing means includes:

3 a maximum number storing unit for storing a maximum
4 number of the supplementary designs in the display image,
5 wherein

6 the display image generating means further
7 includes:

8 a maximum number judging unit for judging whether
9 the number of the supplementary designs to be arranged in
10 the display image exceeds the maximum number; and

11 a display image dividing unit for, when the maximum
12 number judging unit judges that the number of the
13 supplementary designs exceeds the maximum number, sending
14 an instruction to the display image generating unit to
15 divide the display image into the plurality of display
16 sub-images so that supplementary designs less than the
17 maximum number are added to each of the plurality of
18 display sub-images divided from the display image, wherein
19 the display image generating unit generates the plurality
20 of display sub-images according to the instruction.

1 6. The data conversion apparatus of Claim 5, wherein

2 the display link destination converting means
3 further includes:

4 a display link destination sub-information
5 generating unit for generating a plurality sets of pieces
6 of display link destination sub-information which
7 respectively correspond to the plurality of display sub-
8 images generated by the display image generating unit.

1 7. The data conversion apparatus of Claim 6 further
2 comprising:

3 information obtaining means for obtaining, via a
4 communication line, a document written in HTML (Hyper Text
5 Markup Language) which includes at least a character
6 string and at least a piece of image information; and

7 information writing means for writing the document
8 written in HTML into the document storing means.

1 8. The data conversion apparatus of Claim 7 further
2 comprising:

3 first storing means for storing a plurality of video
4 frames which, each having an identifier, are the display
5 image and the plurality of display sub-images;

6 second storing means for storing a plurality sets
7 of pieces of display link destination information which
8 are generated by the display link destination information
9 converting means and are respectively related to the
10 plurality of video frames, wherein each of the plurality
11 sets of pieces of display link destination information
12 having the same identifier as the identifier of a
13 corresponding video frame; and

14 broadcasting means for cyclically transmitting a

15 certain number of video frames in the first storing means
16 and corresponding sets of pieces of display link
17 destination information in the second storing means.

1 9. The data conversion apparatus of Claim 4, wherein
2 the display image generating unit generates the
3 plurality of display sub-images so that each of the
4 plurality of display sub-images includes display image
5 elements of a same category.

1 10. The data conversion apparatus of Claim 9, wherein
2 the document is written in HTML, wherein
3 the display image generating unit determines
4 categories of the display image elements from tags written
5 in the document.

1 11. The data conversion apparatus of Claim 10, wherein the
2 supplementary design storing means includes:

3 a maximum number storing unit for storing a maximum
4 number of the supplementary designs in the display image,
5 wherein

6 the display image generating means further
7 includes:

8 a maximum number judging unit for judging whether
9 the number of the supplementary designs to be arranged in
10 the display image exceeds the maximum number; and

11 a display image dividing unit for, when the maximum
12 number judging unit judges that the number of the
13 supplementary designs exceeds the maximum number, sending
14 an instruction to the display image generating unit to
15 divide the display image into the plurality of display
16 sub-images so that supplementary designs less than the
17 maximum number are added to each of the plurality of
18 display sub-images divided from the display image, wherein
19 the display image generating unit generates the plurality
20 of display sub-images according to the instruction.

1 12. The data conversion apparatus of Claim 11, wherein

2 the display link destination converting means
3 further includes:

4 a display link destination sub-information
5 generating unit for generating a plurality sets of pieces
6 of display link destination sub-information which
7 respectively correspond to the plurality of display sub-
8 images generated by the display image generating unit.

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1 13. A data conversion apparatus which is used as a data
2 transmitting apparatus in a data communication system,
3 wherein the data communication system achieves pseudo
4 interactive communications by using one-way communications
5 between the data transmitting apparatus and a plurality of
6 data receiving apparatuses, the data conversion apparatus
7 comprising:

8 document storing means for storing a plurality of
9 documents each of which includes at least a character
10 string, wherein at least a character string includes a
11 piece of link destination information which specifies
12 another document as a link destination;

13 supplementary design storing means for storing a
14 list of supplementary designs ^{of what?} with serial numbers
15 respectively related to the supplementary designs;

16 display image element generating means for reading
17 the character string from the document storing means and
18 converting the character string into a display image
19 element, wherein the display image element is a bit-mapped
20 graphic;

21 display image generating means for generating a
22 display image which is composed of the display image
23 element, wherein the display image has a size which is

24 equivalent to a size of display screens of the plurality
25 of data receiving apparatuses;

26 supplementary design adding means for reading a
27 supplementary design corresponding to the piece of link
28 destination information specifying the other document as
29 the link destination from the supplementary design storing
30 means and adding the supplementary design to a
31 corresponding display image element in the display image;
32 and

33 display link destination information converting
34 means for converting the piece of link destination
35 information specifying the other document as the link
36 destination into a piece of display link destination
37 information, the piece of display link destination
38 information being related to a serial number corresponding
39 to the supplementary design added by the supplementary
40 design adding means, wherein the piece of display link
41 destination information specifies, as a link destination,
42 another display image which is a display image of the
43 other document generated by the display image generating
44 means.

1 14. The data conversion apparatus of Claim 13, wherein

2 the display image element generating means
3 includes:

4 a conversion table storing unit for storing a
5 character size of the character string; and

6 a display image element generating unit for
7 converting the character string into a display image
8 element according to the character size.

1 15. The data conversion apparatus of Claim 14, wherein

2 the conversion table storing unit further stores a
3 starting position in a horizontal direction of the display
4 image element, wherein

5 the display image generating means includes:

6 a display position calculating unit for reading the
7 starting position of the display image element and
8 calculating a display position of the display image
9 element in the display image; and

10 a display image generating unit for generating the
11 display image by arranging the display image element in
12 the display image according to the display position.

1 16. The data conversion apparatus of Claim 15, wherein

2 the display image generating unit generates a

3 plurality of display sub-images from the document,
4 wherein

5 the display link destination information converting
6 means includes:

7 a display link destination information generating
8 unit for generating a plurality sets of pieces of display
9 link destination information which respectively correspond
10 to the plurality of display sub-images generated from the
11 document.

1 17. The data conversion apparatus of Claim 16, wherein the
2 supplementary design storing means includes:

3 a maximum number storing unit for storing a maximum
4 number of the supplementary designs in the display image,
5 wherein

6 the display image generating means further
7 includes:

8 a maximum number judging unit for judging whether
9 the number of the supplementary designs to be arranged in
10 the display image exceeds the maximum number; and

11 a display image dividing unit for, when the maximum
12 number judging unit judges that the number of the
13 supplementary designs exceeds the maximum number, sending

7 information writing means for writing the document
8 written in HTML into the document storing means.

1 20. The data conversion apparatus of Claim 19 further
2 comprising:

3 first storing means for storing a plurality of video
4 frames which, each having an identifier, are the display
5 image and the plurality of display sub-images;

6 second storing means for storing a plurality sets
7 of pieces of display link destination information which
8 are generated by the display link destination information
9 converting means and are respectively related to the
10 plurality of video frames, wherein each of the plurality
11 sets of pieces of display link destination information
12 having the same identifier as the identifier of a
13 corresponding video frame; and

14 broadcasting means for cyclically transmitting a
15 certain number of video frames in the first storing means
16 and corresponding sets of pieces of display link
17 destination information in the second storing means.

1 21. The data conversion apparatus of Claim 16, wherein
2 the display image generating unit generates the

3 plurality of display sub-images so that each of the
4 plurality of display sub-images includes display image
5 elements of a same category.

1 22. The data conversion apparatus of Claim 21, wherein
2 the document is written in HTML, wherein
3 the display image generating unit determines
4 categories of the display image elements from tags written
5 in the document.

1 23. The data conversion apparatus of Claim 22, wherein the
2 supplementary design storing means includes:

3 a maximum number storing unit for storing a maximum
4 number of the supplementary designs in the display image,
5 wherein

6 the display image generating means further
7 includes:

8 a maximum number judging unit for judging whether
9 the number of the supplementary designs to be arranged in
10 the display image exceeds the maximum number; and

11 a display image dividing unit for, when the maximum
12 number judging unit judges that the number of the
13 supplementary designs exceeds the maximum number, sending

14 an instruction to the display image generating unit to
15 divide the display image into the plurality of display
16 sub-images so that supplementary designs less than the
17 maximum number are added to each of the plurality of
18 display sub-images divided from the display image, wherein
19 the display image generating unit generates the plurality
20 of display sub-images according to the instruction.

1 24. The data conversion apparatus of Claim 23, wherein
2 the display link destination converting means
3 further includes:
4 a display link destination sub-information
5 generating unit for generating a plurality sets of pieces
6 of display link destination sub-information which
7 respectively correspond to the plurality of display sub-
8 images generated by the display image generating unit.

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